A Study of Alternate Item Formats in Accredited Certification Programs

Conducted for the

National Board of Certification and Recertification

for Nurse Anesthetists (NBCRNA)

2013

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SeaCrest is a consulting company specializing in servicing the unique needs of certification programs by providing expertise in certification program accreditation, marketing and communications, program evaluation, certification program management, and certification program start-up endeavors. SeaCrest's primary focus is to help organizations strengthen their certification programs, enhance communications, and achieve accreditation.

The National Board of Certification and Recertification for Nurse Anesthetists (NBCRNA) is a not-for-profit corporation dedicated to promoting patient safety by enhancing provider quality in the field of nurse anesthesia. NBCRNA accomplishes the organization's mission through the development and implementation of credentialing programs that support lifelong learning among nurse anesthetists.

Executive Summary

The National Board of Certification and Recertification for Nurse Anesthetists (NBCRNA) recently completed a research study to determine which accredited certification programs use alternative type formats on their certification examinations, and a follow-on survey of these programs to measure the efficacy of these alternative type formats. Alternate items, or innovative items, are characterized as items that take advantage of the features and functions offered by computer technology to deliver assessments not easily done in traditional paper-and-pencil format (Parshall, Harmes, Davey, and Pashley, 2010). The study targeted certification programs accredited by the following organizations: National Commission for Certifying Agencies (NCCA), the Accreditation Board for Specialty Nursing Certification (ABSNC), and the American National Standards Institute.

For the initial research study, the NBCRNA worked with SeaCrest consulting company to collect publicly accessible data about the use of alternative type formats by the certification organizations in the sample. This information was primarily located on the organizations' websites (e.g. certification handbooks, job analysis summaries, FAQ's). Direct contact with organizations was only initiated in instances where the aforementioned information was unavailable or missing critical research components.

The study determined that 41 of the organizations identified (25%) have implemented alternative item formats. Out of the 439 accredited certification programs collectively administered by these organizations, 124 programs (28%) used the alternative item formats. The alternative item formats most commonly employed were hands-on practical examinations (15%), multiple response tests (11%) and simulation-based assessments (11%).

Building on the results of the initial research, the NBCRNA again worked with SeaCrest to design and conduct an online survey of the 41 organizations identified as having applied alternative item formats. The survey was designed to measure the use and effectiveness of alternative item formats, including specific item types used, performance statistics and overall return on investment. Of the 41 organizations that received an invitation to participate in the survey, 14 respondents (2 partial) accessed the survey, providing a raw response rate of approximately 34%. The majority of respondents (61.54%) defined the profession that they certify or license as healthcare. Of all respondents, 46.15% introduced alternate item formats to their certification examinations prior to 2002.

Key findings include:
- Of the 25 alternate format item types presented on the survey, respondents indicated that 76% are currently used on certification examinations.
- The most prevalent categories (i.e. case studies, multiple correct response, and scenario) were used in 38.46% of surveyed programs.
- Half of survey respondents reported that development of alternate items were more expensive and/or time-consuming than standard multiple choice items, yet only 28.57% of the organizations increased candidate fees with the introduction of alternate items
- The majority of survey respondents (71.43%) have not evaluated the efficiency or profitability of the alternate item by conducting a return on investment analysis.

Initial Study

The purpose of the initial study was to identify which accredited certification programs use alternate item type formats on their examinations. Alternate items, or innovative items, are characterized as items that take advantage of the features and functions offered by computer technology to deliver assessments not easily done in traditional paper-and-pencil format (Parshall, Harmes, Davey, and Pashley, 2010).

Specifically researched were certification programs accredited by the National Commission for Certifying Agencies (NCCA), the Accreditation Board for Specialty Nursing Certification (ABSNC), and the American National Standards Institute (ANSI) 17024. The National Board of Certification and Recertification for Nurse Anesthetists (NBCRNA) requested the services of SeaCrest Company to design and conduct a study that would provide the documentation necessary to demonstrate the alternate formats of examination items, or questions used to assess candidate ability that would be representative of accredited certification programs.

This study involved research based on published information primarily located on the organizations websites (e.g. certification handbooks, job analysis summaries, FAQ's). Direct contact with organizations was only initiated in instances where the aforementioned was unavailable or missing critical research components.

Initial data collected regarding alternate item type usage supported further information collection regarding the value and benefits to certification programs. There are several publications that address the use of alternate items and their potential for improving the ability to assess candidates' more complex knowledge, skills and abilities (Gierl and Lai, 2011; Zenisky and Sireci, 2002).

Methodology

Defining the Accreditation Criterion
Organizations identified in the National Commission for Certifying Agencies (NCCA), the Accreditation Board for Specialty Nursing Certification (ABSNC), and the American National Standards Institute (ANSI) 17024 accredited programs directory in December 2012 were included in this study.

Identifying Data Fields
A draft list of data fields to be collected during research was compiled during a December 2012 conference call. Ultimately the list was expanded to include more granular components as discussions ensued regarding the introduction of an additional phase to this project (online survey). The study includes the following data fields:

1. Accredited Organizations
2. Accrediting Body
3. Alternate Item Type Used
4. Other Format Used
5. Alternate Item Type
6. Certification Contact Name
7. Certification Contact Address
8. Certification Contact Phone
9. Certification Contact Email
10. Sample Alternate Types (URL)

Researching Published Information
Collection of the required data fields is based on published information (e.g. certification handbooks, website content, job analysis summaries, FAQ's) of NCCA, ABSNC, and ANSI 17024 accredited certification programs using alternate item type formats on their examinations. Approximately 6% of the data fields were acquired through direct telephone inquiry.

Results

A total of 119 NCCA, 42 ANSI, and 18 ABSNC organizations (n=179) with accredited certification programs were involved in this study. It was determined that 13 of the organizations were dually accredited.

The research collected of the organizations, excluding the 13 dually accredited organizations, (n=166) demonstrated that 41 currently had implemented alternate item formats (25%) to assess candidate ability on their certification examinations.

Collectively, the 166 organizations had 439 accredited certification programs; only 124 programs (examinations) were using alternate item types (28%). Research depicting some of the data field variables is depicted in the following table and graphic.

Accredited Certification Programs Summary

Certification Programs Summary	NCCA	ABSNC	ANSI	Total	Total Percentage
Organization's Accredited Certification Programs	265	55	119	439	
Organization's Accredited Certification Programs w/ Alternate Item Types				124	28%

Certification Program to Organization Ratio
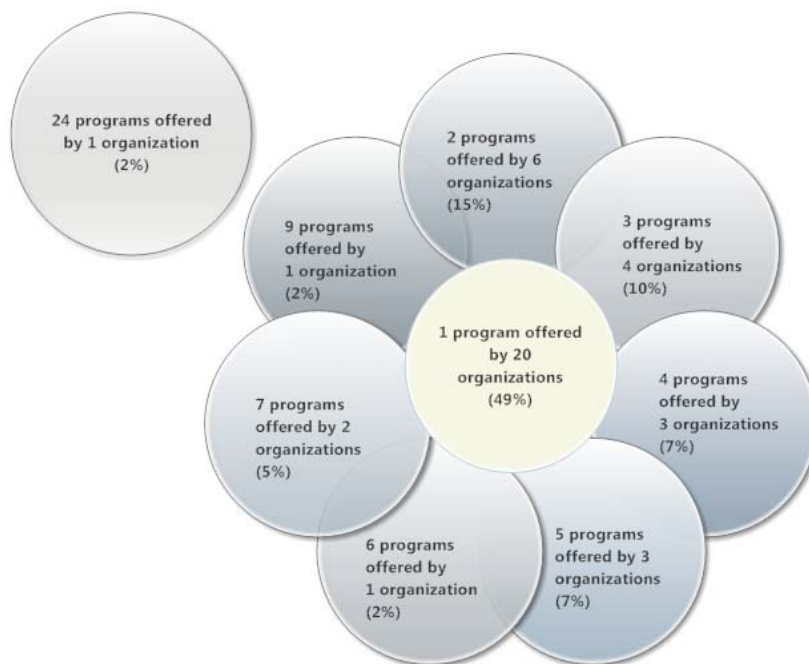
Reviewing data collected from the 124 certification programs currently using alternate item types yielded approximately 24 different format categories. Instances of categories which yielded less than 2% were typically formats unique to a specific industry (i.e. information technology). Categories yielding an 11% to 15% return (practical exams, multiple select, and simulations) may represent the current universal alternate item format of assessing candidate ability.

Data of format categories were combined if titles and the published descriptions were similar in nature. These instances and the complete alternate format summary are depicted in the following table.

Item Format Summary

Alternate Item Type Summary	Total	Total Percentage
Active Screen	1	1%
Build List / Reorder	1	1%
Calculations	2	3%
Case Studies	3	4%
Create-a-tree	1	1%
Drag-and-drop	5	7%
Essays	2	3%
Fill-in-the-blank	2	3%
Graphic/Video	2	3%
Hands-on Practical Examination / Field Examination	**11**	**15%**
Hotspot / Hot area	5	7%
Multiple Response / Select	**8**	**11%**
Oral Examination	2	3%
Repeated Area Choices	1	1%
Scenario	6	8%
Medical record case scenario	(1)	1%
Short Answer Code	1	1%
Simlet	1	1%
Simulation	**8**	**11%**
**Simulation exam w/ case management problems*	(1)	1%
**Simulation exam w/ case scenarios*	(1)	1%
**Text-based simulation*	(1)	1%
**Clinical simulation*	(1)	1%
Sorted List	1	1%
Testlet	2	3%
True or False	1	1%
Video Practical Examination / Video Examination	3	4%
Visual Materials (graphs/photographs)	4	5%
Written Examination	1	1%

Data incorporated into the Scenario category

Data incorporated into the Simulation category

Approximately 21% of the accredited organizations using alternate formats provided stakeholders with published sample items.

Follow-on Survey

After gathering publicly accessible data to determine which certification organizations used the alternative type formats, the NBCRNA again requested the services of SeaCrest consulting company to produce and direct an online survey with the intent of collecting insightful data about specific alternate item formats, their performance, and overall return on investment.

The study involved development of a web-based alternate item format survey, distribution of the survey to targeted organizations of accredited certification programs during April-May 2013, and an analysis of their responses. The survey was sent to the 41 organizations identified as using the alternative item formats. Of the 41 organizations, 14 responded to the survey. After adjusting for opt outs (n=2), it was determined that approximately 34% of the sample responded. The majority of respondents (61.54%) defined the profession that they certify or license as healthcare. Of all respondents, 46.15% introduced alternate item formats to their certification examinations prior to 2002.

The survey results are outlined in the following sections.

Methodology

The 2012/2013 National Board of Certification and Recertification for Nurse Anesthetists Alternate Item Format Study involved two sets of processes or activities that ran more or less consecutively: a research study and a web-based survey. The purpose of the development and administration of the survey was to collect information about specific alternate item formats, their performance, and overall return on investment from accredited certification programs.

Defining the Accreditation Criterion
Organizations identified in *A Study of Alternate Item Formats in Accredited Certification Programs (*January 2013) as being in the National Commission for Certifying Agencies (NCCA), the Accreditation Board for Specialty Nursing Certification (ABSNC), and the American National Standards Institute (ANSI) 17024 accredited programs directory and using alternate item formats were included in the survey study.

Identifying Content Domains
The processes and activities of the survey were divided into seven domains: Introduction, Test Content, Examinee Performance, Item Analysis, Scoring, Publications, and Contact Information.

Study Chronology
The study proceeded in five general phases.

December 2012
- The alternate item type format research study was conducted.

January 2013
- The study results were analyzed.

March - April 2013
- SeaCrest along with staff from the NBCRNA drafted the survey.
- The survey was pilot tested and revised.

April - May 2013
- The final survey was administered on the web.

June 2013
- The survey results were analyzed.

Survey
In April through May 2013, the 41 organizations selected to receive the web-based survey were sent three email notifications via SurveyMonkey®: the alternate item format survey and two follow-up reminders. The survey email bodies explained the history, purpose and importance of the survey. The emails indicated that the participant may request a copy of the aggregate data collected.

The first email reminder was sent approximately two-weeks after the alternate item format survey; the final email reminder was sent approximately one-week prior to the end of the survey.

Results

The survey was accessible via the Internet through the response deadline of May 20, 2013. Of the 41 e-mail invitations distributed, zero e-mails were returned due to undeliverable addresses and two replied to opt out the survey. A total of 14 respondents (2 partial) accessed the survey, providing a raw response rate of approximately 34%.

Demographic Information

Of the 41 selected organizations, 29 were identified as NCCA accredited, 12 as ANSI accredited, and 4 as ABSNC accredited; it was determined that four of the organizations are dually accredited as depicted.

The figure below summarizes the survey respondents' position titles. Five organizations did not answer this question.
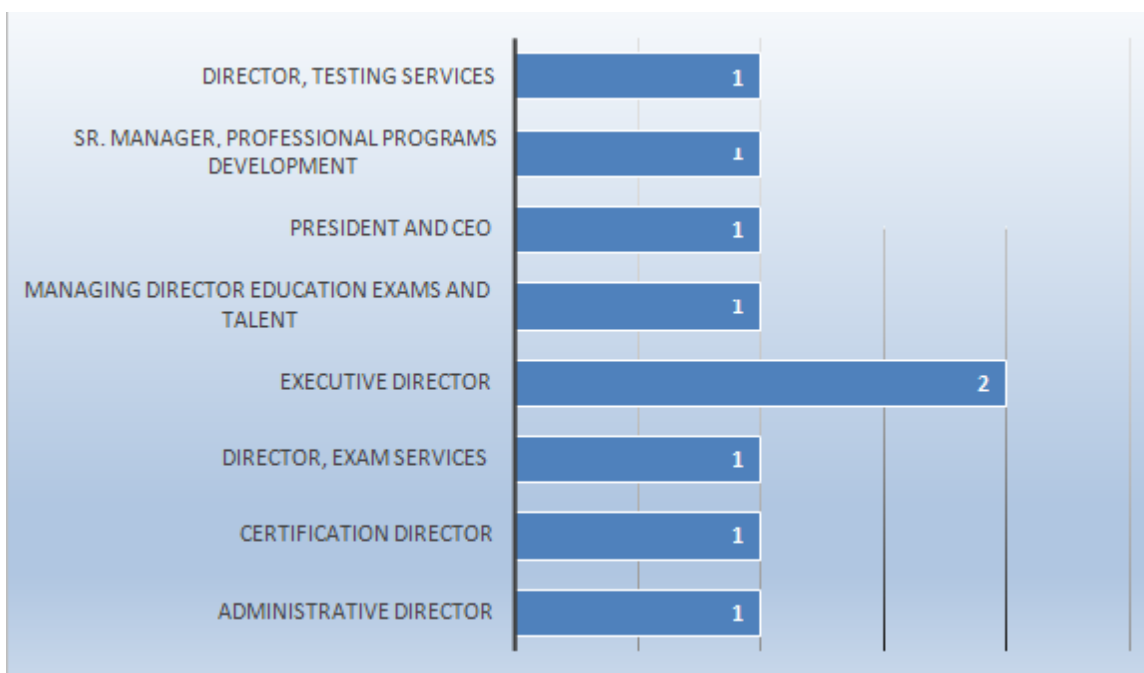

Survey respondents were asked to indicate what category defines the profession that they certify or license. As shown in below, the largest group of respondents (61.54%) defined their profession as healthcare. One organization did not answer this question.

Profession Category

Q1 What category best defines the profession that you certify or license?

Answered: 13   Skipped: 1

7.69%
(1)

7.69%
(1)

15.38%
(2)

7.69%
(1)

61.54%
(8)

Financial   Fitness   Healthcare   Medical   Technology
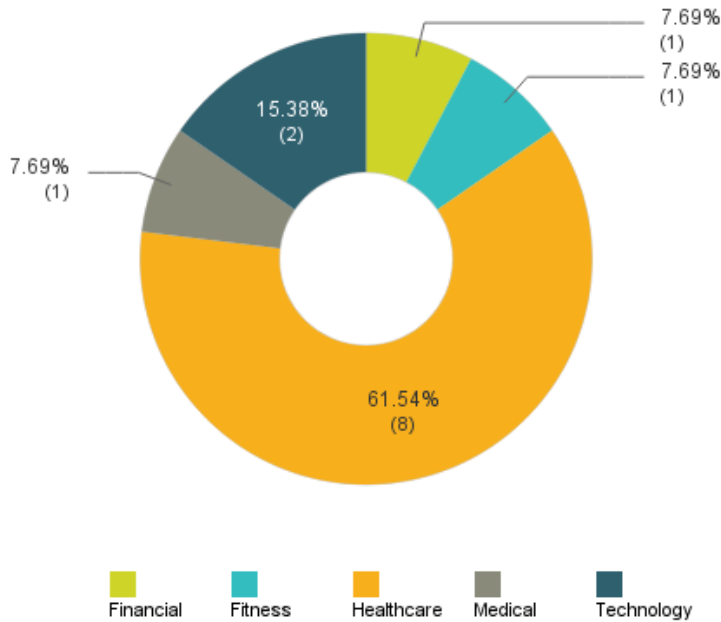
As depicted in the following graph, the majority of survey respondents introduced alternate item formats to their certification examinations prior to 2002 (46.15%). One organization did not answer this question.

Alternate Item Introduction

Q8 When did your organization introduce alternate item formats to your certification examinations?

Answered: 13   Skipped: 1

Period	Count
2011 - 2013	1
2008 - 2010	3
2005 - 2007	2
2002 - 2004	1
Prior to 2002	6

0   3   6   9   12   15
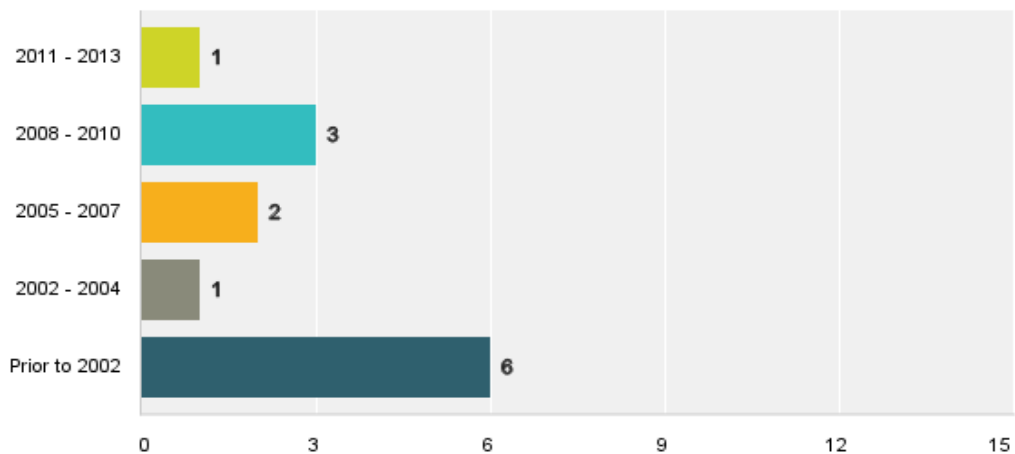
Content Domains

Below is data on each of the survey's seven content domains.

Introduction Domain

The number of accredited certification programs offered by organizations varied with the majority of respondents equally offering (30.77%) either ten or more programs or one program. The chart below depicts the number of certification programs offered by organizations using alternate item formats. One organization did not answer this question.

Certification Programs

Q2 How many certification programs does your organization offer?

Answered: 13   Skipped: 1

10 or more
30.77% (4)

1
30.77% (4)

2
7.69% (1)

4
7.69% (1)

6-10
15.38% (2)

5
7.69% (1)
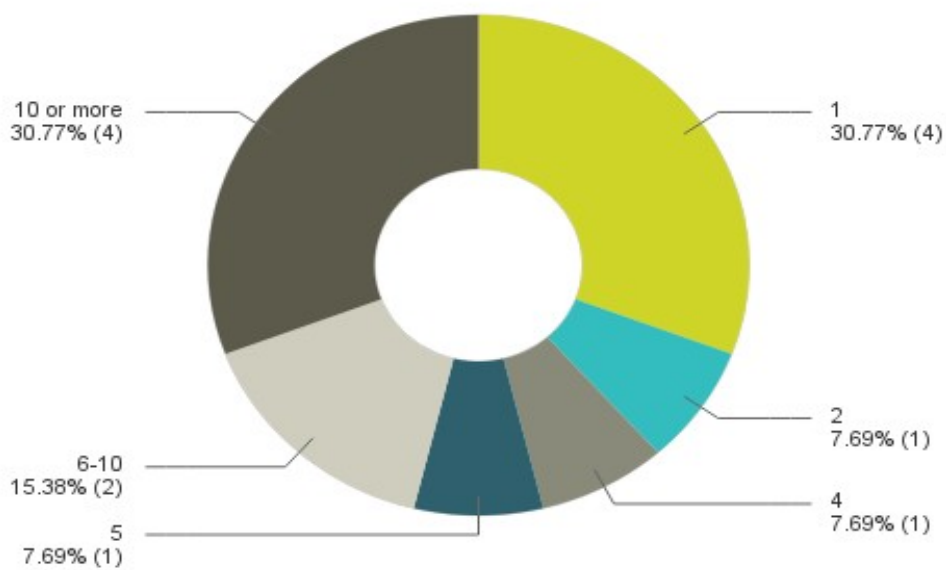
Of the 25 alternate item types presented on the survey, respondents indicated that 76% are currently used on certification examinations. The most prevalent categories (case studies, multiple correct response, and scenario) yielded a 38.46% return. Zero-response alternate item type options included active screen, create-a-tree, oral examination, repeated area choices, short answer code, and true or false. The following figure summarizes which alternate item formats were indicated as being used on survey respondent's certification examinations.

Alternate Item Formats on Examinations
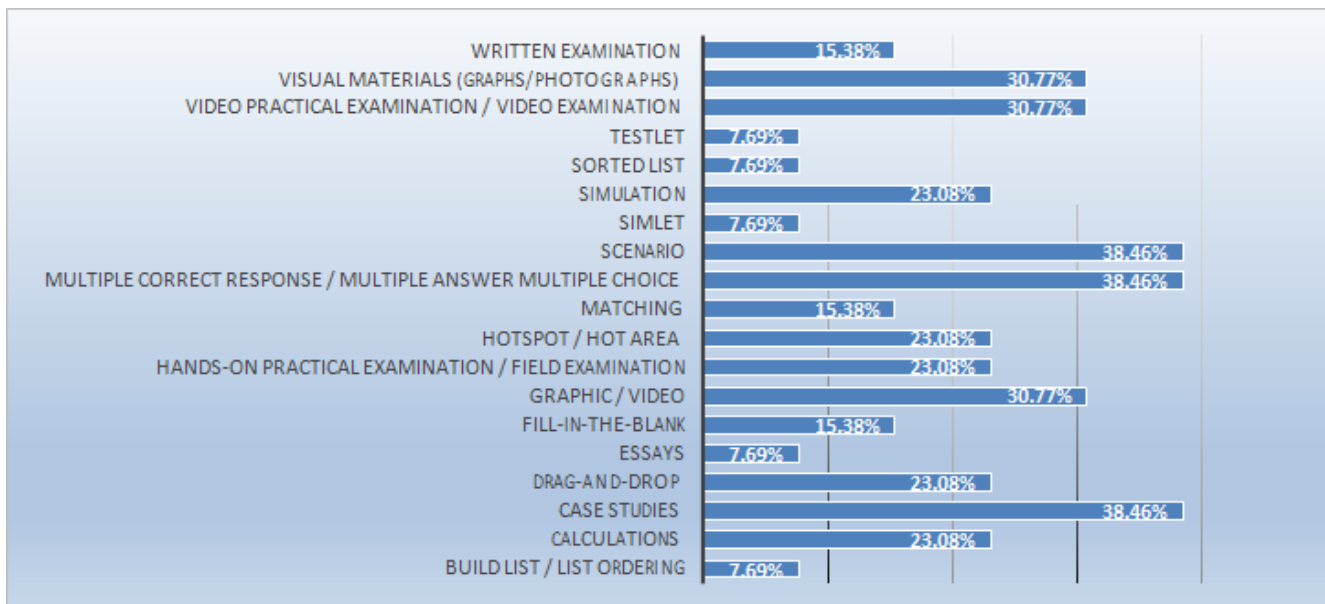
Five organizations indicated using only one type of alternate item format on their certification examination (38.46%) while one organization currently uses eleven types of alternate item formats (7.69%). No correlation between the number of certification programs offered and the number of different types of alternate item formats was discovered.

As shown in below, the majority of respondents (61.54%) indicated that none of the identified alternate item formats elicit multiple responses.

Multiple Responses

Answer Choices	Responses
Build List / List Ordering	7.69% 1
Drag-and-drop	23.08% 3
Graphic / Video	15.38% 2
Hotspot / Hot area	7.69% 1
Multiple Correct Response / Multiple Answer Multiple Choice	30.77% 4
None	61.54% 8
Scenario	7.69% 1
Simulation	15.38% 2
Sorted List	7.69% 1
Visual Materials (graphs/photographs)	7.69% 1

Test Content Domain

The survey's design was meant to elicit information regarding the overall return on investment of alternate item formats on certification examinations. Half of survey respondents (n=7) conferred that development of alternate items were more expensive and/or time-consuming than standard multiple choice items. While the use of alternate item formats raises potential cost issues, only 28.57% of the organizations increased candidate fees with the introduction of alternate items. The majority of survey respondents (71.43%) have not evaluated the efficiency or profitability of the alternate item by conducting a return on investment (ROI) analysis.

Examinee Performance Domain

A small representation of respondents (14.29%) have data demonstrating that an examinee's competence is assessed more authentically with alternate item formats (case studies, hands-on practical examination / field examination, and video practical examination / video examination). Of the organizations evaluating examinee response time to alternate item formats (n=8), the table below demonstrates how much time examinees require to answer alternate item formats in comparison to multiple choice items.

Typical Response Time

	Less than Multiple Choice	About the Same as Multiple Choice	More than Multiple Choice	N/A	Total
Active Screen	0%	0%	0%	100%	3
Build List / List Ordering	0%	33.33%	0%	66.67%	3
Calculations	0%	25%	50%	25%	4
Case Studies	0%	0%	60%	40%	5
Create-a-tree	0%	0%	0%	100%	3
Drag-and-drop	0%	0%	66.67%	33.33%	3
Essays	0%	0%	25%	75%	4
Fill-in-the-blank	0%	0%	66.67%	33.33%	3
Graphic / Video	0%	80%	20%	0%	5
Hands-on Practical Examination / Field Examination	20%	40%	0%	40%	5
Hotspot / Hot area	0%	50%	0%	50%	4

Matching	0%	33.33%	33.33%	33.33%	3
Multiple Correct Response / Multiple Answer Multiple Choice	0%	25%	50%	25%	4
Oral Examination	0%	0%	0%	100%	3
Repeated Area Choices	0%	0%	0%	100%	3
Scenario	0%	60%	20%	20%	5
Short Answer Code	0%	0%	0%	100%	3
Simlet	0%	0%	0%	100%	3
Simulation	0%	25%	50%	25%	4
Sorted List	0%	0%	25%	75%	4
Testlet	0%	0%	0%	100%	3
True or False	0%	0%	0%	100%	3
Video Practical Examination / Video Examination	0%	40%	20%	40%	5
Visual Materials (graphs/photographs)	0%	80%	0%	20%	5
Written Examination	0%	33.33%	0%	66.67%	3

Item Analysis Domain

Item analyses are critical for test development (certification or licensure) and gather statistics used to identify any potential problems with items (operational or unscored). A majority of survey respondents (83.33%) have performed item analyses on their alternate items. In considering the level or degree of difficulty of alternate item formats, survey participants were asked if their organization had any data supporting a comparison between standard multiple choice and alternate item formats. The following charts depicts this comparison of item format difficulty; four organizations did not answer this question.

Item Format Difficulty
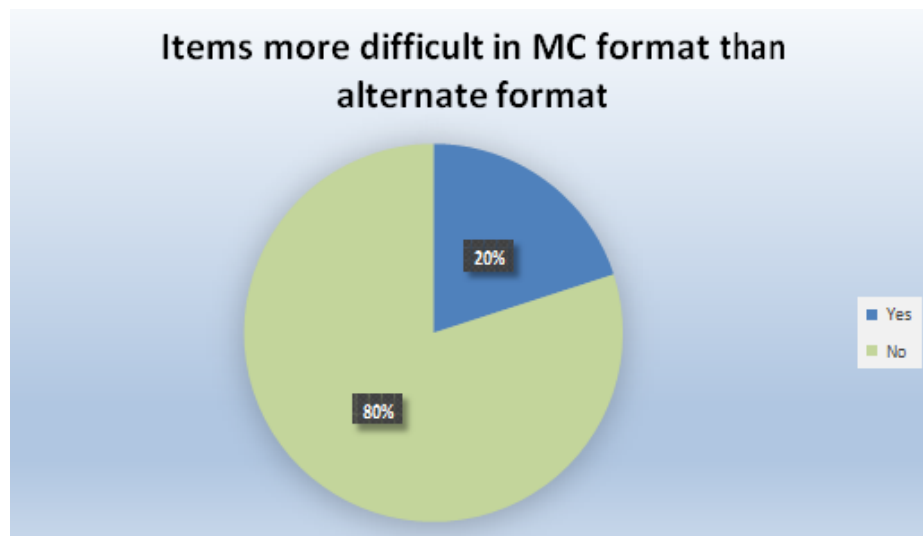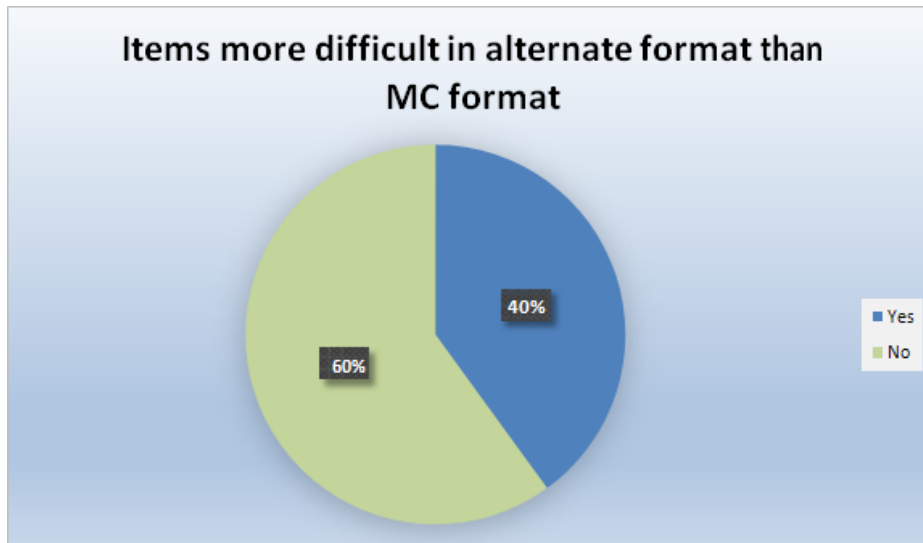
*MC=Multiple Choice

To ascertain how well the alternate items discriminate between examinees who are knowledgeable in content areas and those who are not, survey respondents provided feedback based on their certification examinations as shown below.

Alternate Item Discrimination

In general, how do your alternate items discriminate on your examination(s)?

|	Lower than Multiple Choice	About the Same as Multiple Choice	Higher than Multiple Choice	N/A	Total
Active Screen	0%	0%	0%	100%	3
Build List / List Ordering	0%	0%	0%	100%	3
Calculations	0%	33.33%	33.33%	33.33%	3
Case Studies	0%	0%	25%	75%	4
	0%	0%	0%	100%	3
Graphic / Video	0%	33.33%	33.33%	33.33%	3
Hands-on Practical Examination / Field Examination	0%	0%	25%	75%	4
Hotspot / Hot area	0%	33.33%	0%	66.67%	3
Matching	0%	0%	33.33%	66.67%	3
Multiple Correct Response / Multiple Answer Multiple Choice	0%	33.33%	33.33%	33.33%	3
Oral Examination	0%	0%	0%	100%	3
Repeated Area Choices	0%	0%	0%	100%	3
Scenario	0%	0%	33.33%	66.67%	3
Short Answer Code	0%	0%	0%	100%	3
Simlet	0%	0%	33.33%	66.67%	3
Simulation	0%	0%	33.33%	66.67%	3
Sorted List	0%	0%	0%	100%	3
Testlet	0%	0%	0%	100%	3
True or False	0%	0%	0%	100%	3
Video Practical Examination / Video Examination	0%	25%	25%	50%	4
Visual Materials (graphs/photographs)	0%	33.33%	0%	66.67%	3
Written Examination	0%	0%	0%	100%	3

Scoring Domain

Typically in test development, items are subject to pre-testing and associated statistical analyses prior to their use in an examination as an operational (scored) item. The purpose of a pretest (unscored) item may be to collect additional information about a subject, or evaluate new question formats. Survey respondents were asked if the alternate items on their examinations were pretest only. As shown in below, the largest group of respondents (54.55%) indicated the status of alternate items as operational.

Pretest vs. Scored

Q24 Are the alternate items on your examinations pretest (unscored) only?

Answered: 11   Skipped: 3

Yes
9.09% (1)

A ratio of
scored and
pretest
36.36% (4)

No
54.55% (6)
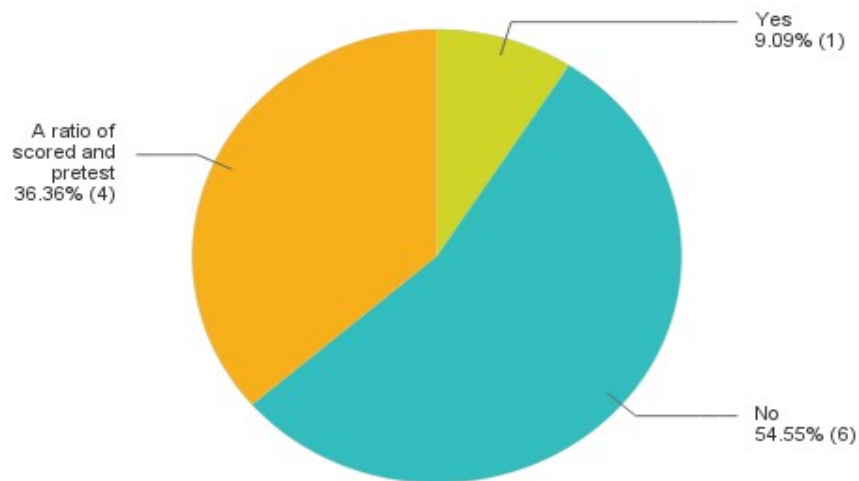
The test development process requires the establishment of a minimum standard to pass the examination. This standard, or passing point, must be reached by examinees to achieve certification. As shown in below, survey respondents were asked how the alternate item formats on their examinations are scored — dichotomously (all correct or all incorrect) or polytomously (rating scale, partial credit, or other advanced scoring procedures).

Dichotomously vs. Polytomously
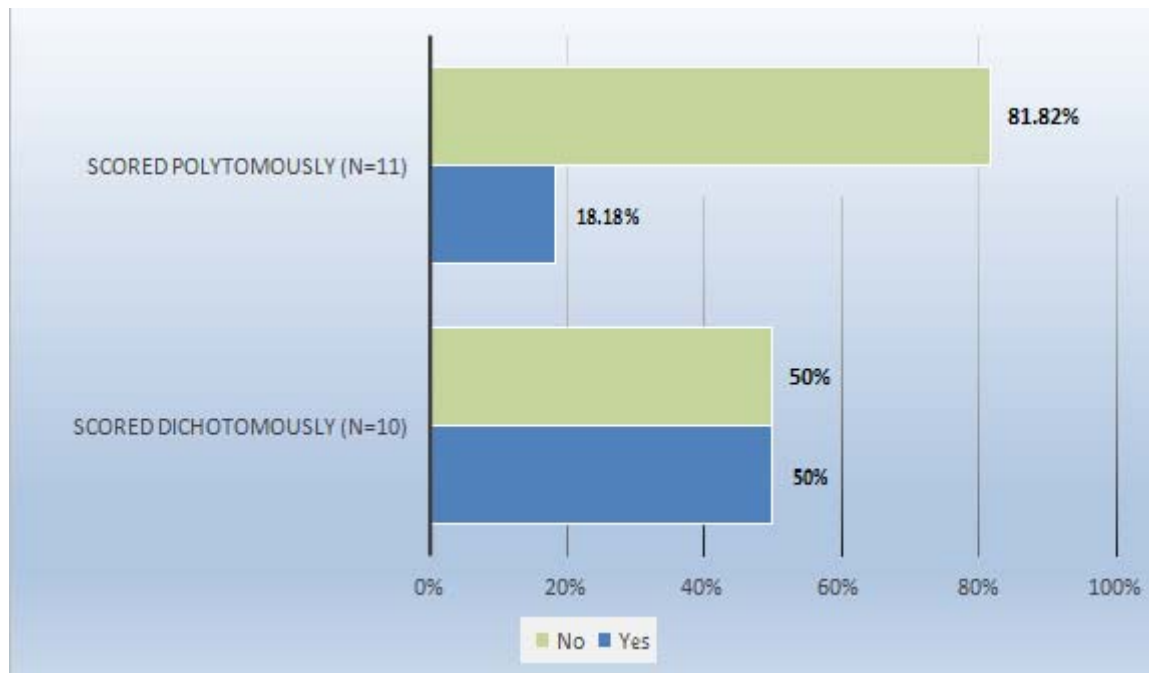
A small minority of survey respondents (28.57% and 14.28% respectively) identified which alternate item formats are scored dichotomously and polytomously as depicted below.

Dichotomously Alternate Items

Which alternate item formats are scored dichotomously?

Answer Choices	Responses
Calculations	50%
Drag-and-drop	25%
Fill-in-the-blank	25%
Graphic / Video	75%
Hotspot / Hot area	50%
Matching	25%
Multiple Correct Response/ Multiple Answer Multiple Choice	50%
Scenario	50%
Sorted List	25%
Visual Materials (graphs/photographs)	75%

Polytomously Alternate Items

## Which alternate item formats are scored polytomously?

Answer Choices	Responses
Drag-and-drop	50%
Graphic / Video	50%
Simulation	100%

Survey respondents were asked to indicate what percentage of all examinations is scored using human/expert raters. As shown in below, approximately 57% of respondents do not use this scoring method.

Human/Expert Raters

Q6 What percentage of all examinations are scored using human/expert raters?

Answered: 14   Skipped: 0

90% - 100%	7.14%
50% - 59%	7.14%
Less than 50%	28.57%
Not applicable	57.14%
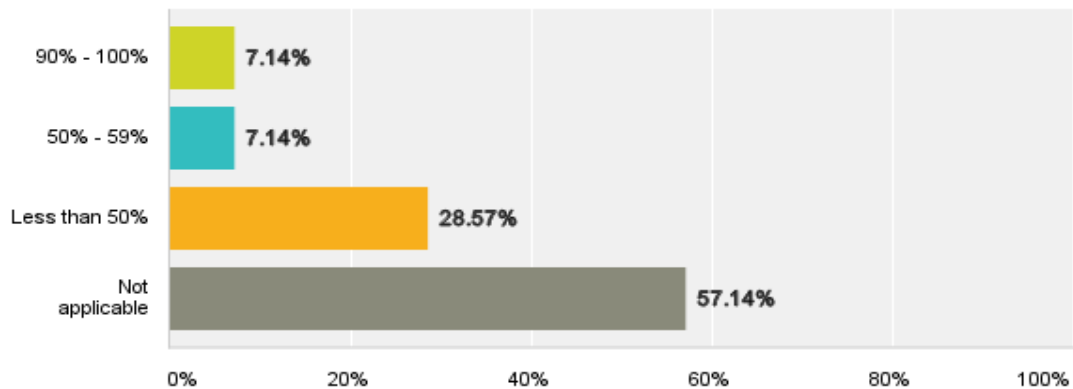
Publications Domain

While approximately half of survey respondents (46.15%) introduced alternate item formats to their certification examinations prior to 2002, only one organization has published research or white papers regarding alternate item formats. Three organizations indicated being in the process of publishing new research or white papers. Three organizations did not answer this question.

Contact Information Domain

Participants were notified in all correspondence that they may request a copy of the aggregate data collected in the survey. The vast majority of respondents (92.85%) provided email addresses accordingly.

Exchange of Information

As depicted in following image, survey respondents were asked of their willingness to share information in six domains: Introduction, Test Content, Examinee Performance, Item Analysis, Scoring, and Publications. Receptive respondents (64.28%) were able to provide their organization, contact name, contact title, phone and email in the Contact Information domain for potential follow-up by the NBCRNA.

Exchange of Information